
participatory exploration
the role of the user contribution system

a presentation by **nicholas skytland**

given at the 2009 NASA Project Management Challenge

available for download at http://www.slideshare.net/skytland

what is **“work”** ?

what is a **“worker”** ?

what is the **“office”** ?

what is a **“contribution”** ?

what is **“innovation”** ?

what does this mean in a
world and workforce that is increasingly
connected and **networked** ?

in a global economy that is increasingly dependent on **people** and their **knowledge**, **skills**, **energy**, and **expertise** ?

in environments fueled by the development of collaborative **technologies** and **platforms** ?

lets explore how **NASA** can apply

the global shift in **demographics**
a desire for **participation** and **engagement** and
the emergence of **collaborative technology**

to the **future of space exploration**

I the evolution of work

II the engagement gap

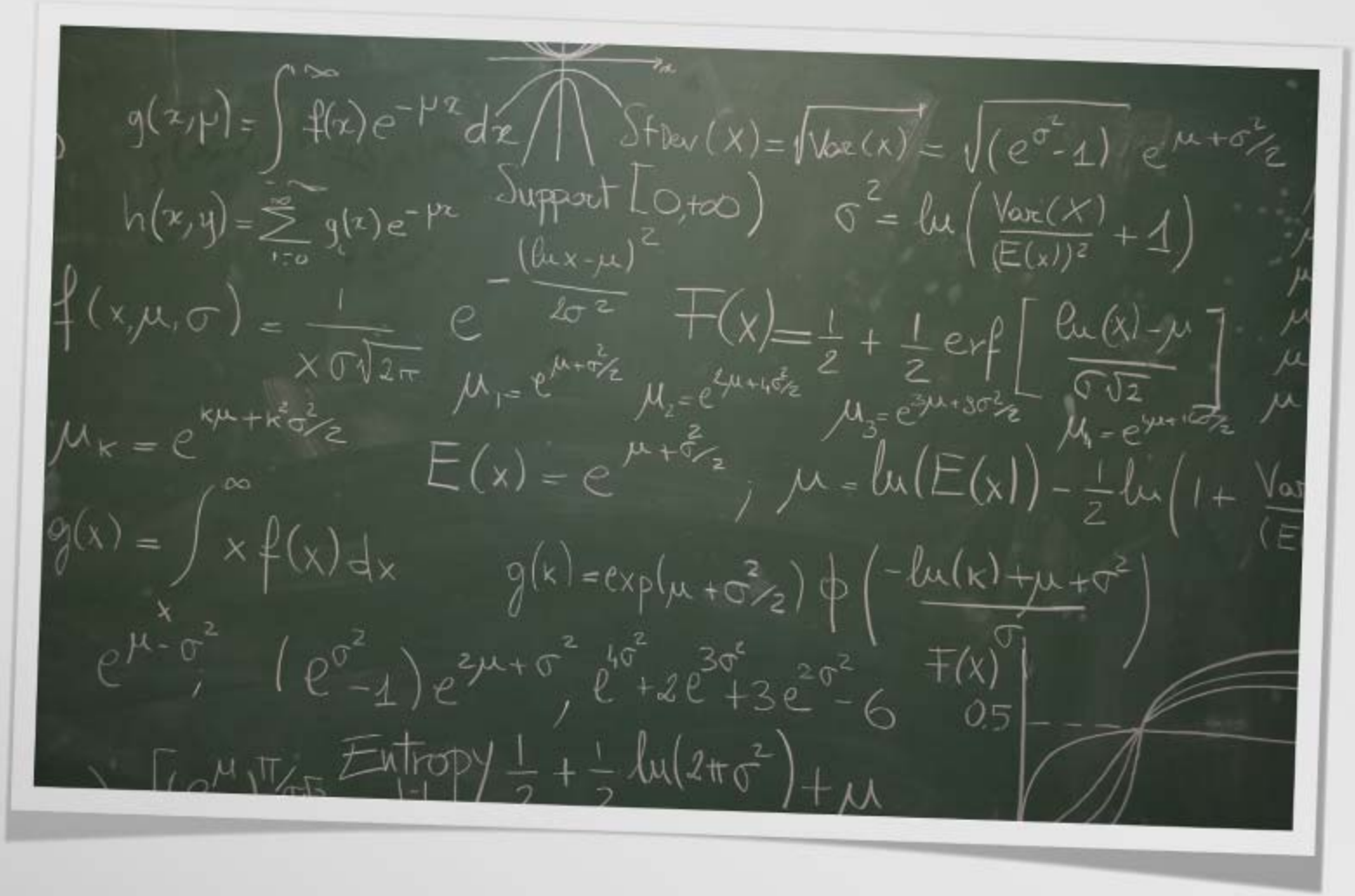
III user contribution systems

IV a case study

V takeaways

I the evolution of work

the industrial age revolutionized work by replacing **muscle** with **machines**



work was defined in reductionist terms as the **application of energy to matter** to transform it

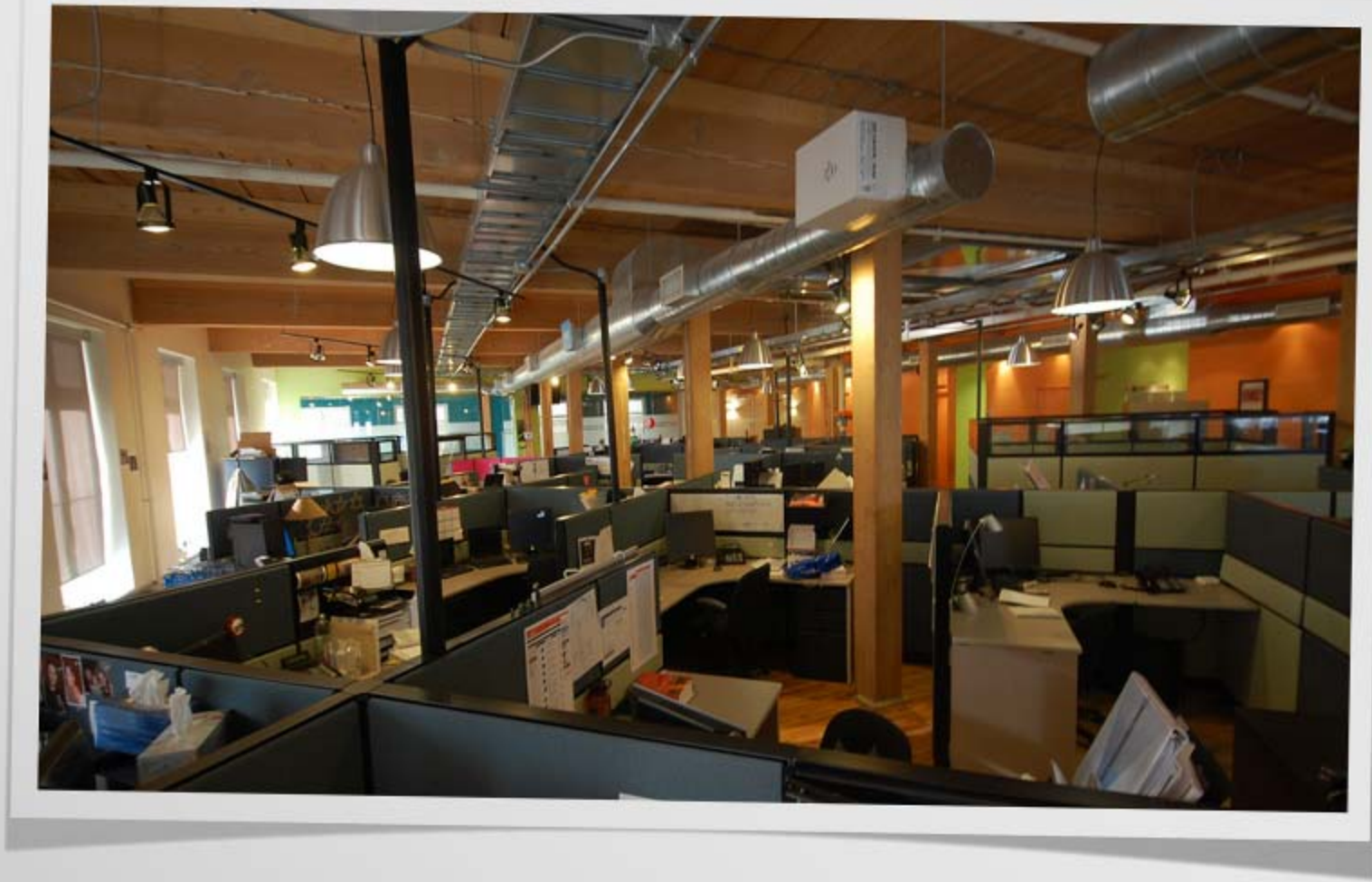
the **worker** was reinvented

everyone could **contribute**

work was **mechanized**

the concentration of labor into factories brought about the rise of large towns

industrialization laid the foundation for the modern world



it has shaped everything from
where we work...

to **when we work**...

to **how we work**

“work” is changing

(again)

we are moving from
the **machine age** to the **information age**

Structure	Hierarchical →	Networked
Scope	Internal/closed →	External/open
Resource Focus	Capital →	Human, information
State	Static, stable →	Dynamic, changing
Personnel/focus	Managers →	Professionals
Key drivers	Reward and punishment →	Commitment
Direction	Management commands →	Self-management
Basis of action	Control →	Empowerment to act
Individual motivation	Satisfy superiors →	Achieve team goals
Learning	Specific skills →	Broader competencies
Basis for compensation	Position in hierarchy →	Accomplishment, competence level
Relationships	Competitive (my turf) →	Cooperative (our challenge)
Employee attitude	Detachment (it's a job) →	Identification (its' my company)
Dominant requirements	Sound Management →	Leadership

the implications are profound

"Work has become more cognitively complete, more team-based and collaborative, more dependent on social skills, more time pressured, more reliant on technological competence, more mobile, and less dependent on geography."

Wikinomics by Don Tapscott and Anthony Williams

work is increasingly the
application of knowledge
and **manipulation of information**

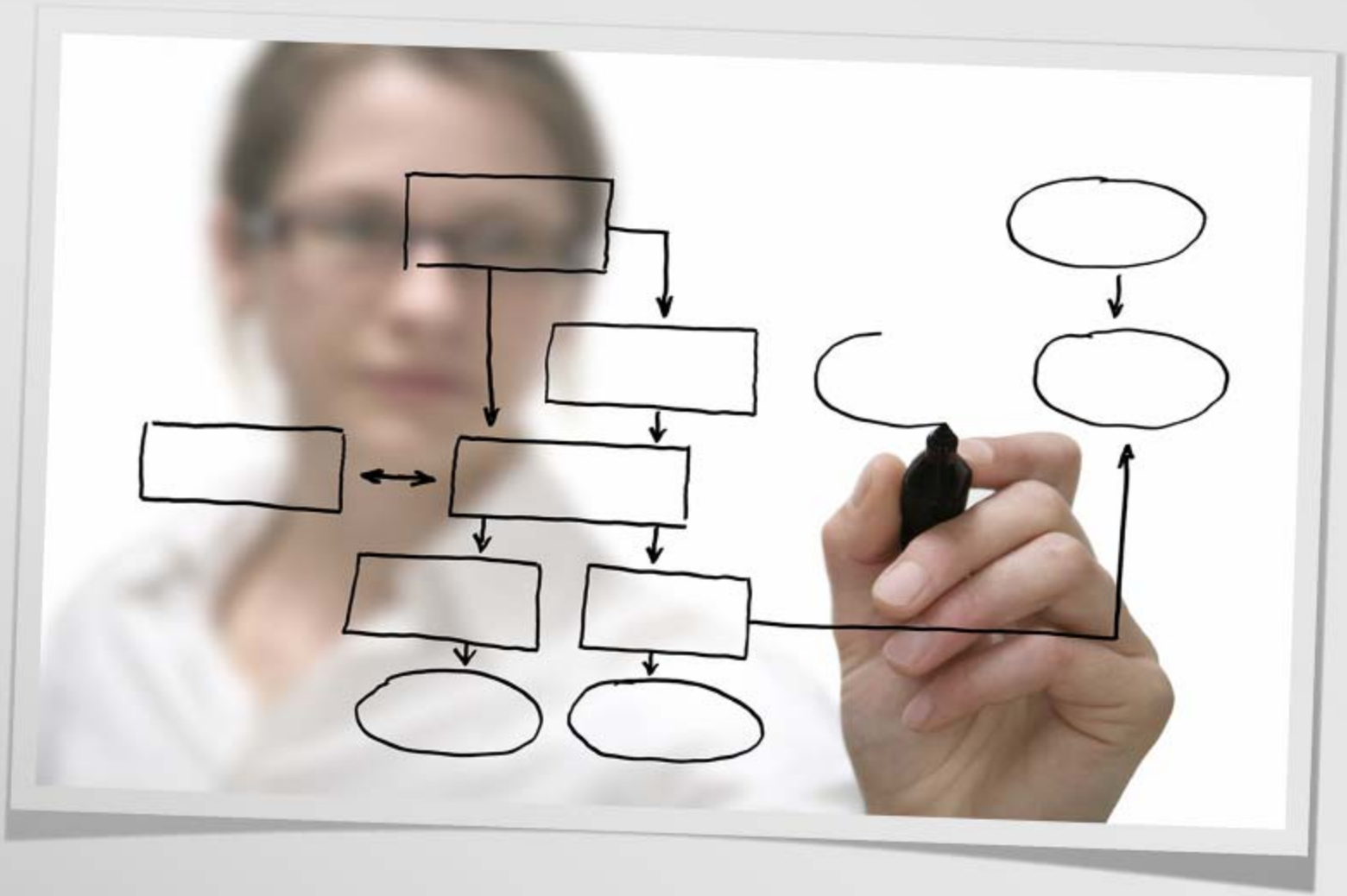
people are more than ever a source of critical **skill** and **knowledge** as well as sustainable **competitive advantage**

"Previous technological-driven revolutions, like the electrification of industry, took the better part of a century to unfold. Today the escalating scope and scale of the resources applied to innovation means that **change will unfold more quickly**."

Wikinomics by Don Tapscott and Anthony Williams

the **worker** is being re-invented

when, where and **how** we work is less important



because enormously powerful collaboration tools are reshaping our work systems

and putting unprecedented power
into the hands of individuals

"The younger generation are not passive recipients of mass consumer culture, they spend their time **searching, reading, scrutinizing, authenticating, collaborating, and organizing** (everything from their MP3 collections to protest demonstrations). The internet makes life an ongoing, massive collaboration, and this generation loves it."

Wikinomics by Don Tapscott and Anthony Williams

added to changes in technology and the workplace are changes in **demographics**

"Generational workplace norms - **speed, freedom, openness, innovation, mobility, authenticity, and playfulness** - can form the basis of a revitalized and innovative workforce - but can also raise tough challenges for employers seeking to adapt to new expectations."

Wikinomics by Don Tapscott and Anthony Williams

companies are beginning to leverage the shift of **technology**, **demographics**, and **behaviors** in the workplace...

by creating new ways for people to volunteer their **time**, **energy**, and **expertise** to help accomplish the mission

the challenge for organizations
is to build or utilize new work systems
that take advantage of the larger global shifts

The term "**enterprise 2.0"** is used a lot today in business to describe how organizations can implement novel technologies, provide software as a service, and use the web as a platform.

	Industrial Age	Information Age
1. World View	National	Global
2. Corporate Boundaries	Vertically Integrated	Flat Context, agency
3. Value Innovation	Do It Yourself	Open Innovation Co-Creation
4. Intellectual Property	Proprietary Protected	Open Shared
5. Modus Operandi	Plan and Push Hierarchical	Engage and Collaborate Self-Organizing
6. Business Processes	Internal Applications Hardwired	External Enterprise Integration Modular Reconfigurable
7. Human Capital & Knowledge Capital	Traditional Demographics	Global Resources
8. Information Liquidity	Opaque	Transparent
9. Relationships	Product/Services	Experiences
10. Technology	Proprietary Task Specific	Standards-based Interoperable Service Orientated

organizations can use collaborative technologies to take advantage of shifting expectations in the workplace

II

the engagement gap

today, a large number of people are looking to make a difference in an **organization** that can make a difference in the **world**

people want to be **engaged**

are we engaging our workforce?

"Most companies can barely manage to research the fundamental disciplines that contribute to their products, let alone retain the field's most talented people within their boundary. So to ensure that they remain at the forefront of their industries, **companies must increasingly open their doors to the global talent** pool that thrives outside their walls."

Wikinomics by Don Tapscott and Anthony Williams

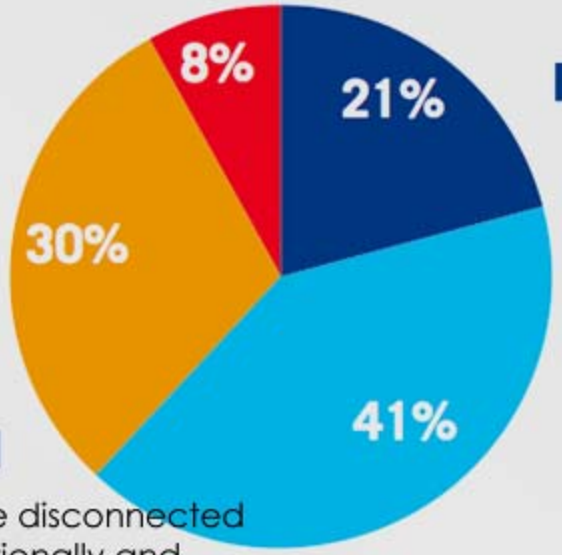

TOWERS
PERRIN
Towers Perrin surveyed 90,000 employees in 18 countries and focused on drivers of attraction, retention, and engagement in the workplace

this is what they found...

TOWERS PERRIN

the partly disengaged, with lower scores on all three components of engagement, especially the emotional connection

Disengaged



Engaged

those giving full discretionary effort, with high scores on all three dimensions

Disenchanted

those who have disconnected rationally, emotionally and motivationally

Enrolled

the partly engaged, with higher scores on the rational and motivational dimensions, but less connected emotionally

As *Exhibit 1* shows, only a fifth of the respondents in our global study can be categorized as engaged. The largest segment, over 40%, is the so-called "enrolled," perhaps best described as capable but not fully committed. The remainder are either disenchanted (almost a third of the total) — likely doing the minimum to get by — or completely disengaged. (For a look at engagement levels across the countries in our study, see Appendix B, page 21.)

Put another way, almost four out of five workers are not living up to their full potential or doing what it takes to help their organizations succeed. More disturbing still, almost two out of five (the disenchanted and disengaged) have already "checked out" to some extent. For employers, the implication is clear: They are not harnessing the full power of their workforce and achieving the performance lift that high engagement delivers.

The size of this gap would be disturbing at any time. But it is particularly so today for two well-documented reasons:

- The global knowledge-based economy is increasingly dependent on people and their knowledge, skills, energy and dedication.
- Demographic trends suggest looming shortages of key skills across industries and regions of the world — raising the risk of losing sought-after talent and dealing with the consequences of managing a significantly disengaged or disenchanted population.

Because of these challenges, continued business growth today often depends on maximizing the contribution of virtually every employee, and certainly the cadre of talent most critical to ensuring that an organization's products and services consis-

TOWERS PERRIN

The study found that companies with the highest levels of employee engagement achieve better financial results and are more successful in retaining their most valued employees than companies with lower levels of engagement

TOWERS PERRIN

The study also concluded that organizations have a surprisingly pivotal role to play in developing an engaged workforce if they focus on the right things

vary by country (see Appendix B, page 21), as well as by various demographic factors like age, senior management's ability to demonstrate genuine interest in employees is the top engagement driver not only globally, but in at least seven countries, and is on the top 10 list in all but six countries. This finding speaks to the enormous influence that a company's top leaders have on their extended global teams, even among people they have never met and may never meet.

TOWERS PERRIN

Top 10 Drivers of Employee Engagement Globally

1. **Senior management sincerely interested in employee well-being**
2. Improved my skills and capabilities over the last year
3. **Organization's reputation for social responsibility**
4. Input into decision making in my department
5. **Organization quickly resolves customer concerns**
6. Set high personal standards
7. **Have excellent career advancement opportunities**
8. Enjoy challenging work assignments that broaden skills
9. Good relationship with supervisor
10. **Organization encourages innovative thinking**

At its core, our current study confirms what most organizations know intuitively: Engagement is about the work environment and nature — even texture — of the work experience. It is about the unique intangibles that effective leaders create

people around the world want to invest their skills and knowledge on behalf of their employers

yet few organizations leverage those resources to their advantage

organizations have a **major opportunity**
to engage a global workforce to help solve
mission relevant problems

III

user contribution systems

"**Traditional hierarchies still exist.** Bosses still expect to be bosses. Command and control is alive and well."

Jeff Pfeffer, Stanford Graduate School of Business

how do we forge a **new work system**
to engage the world's best talent?

"Business performance in an information society means knowing how to **mobilize collective intelligence**."

Olivier Zara, Axiopole

shared design
open innovation
open architecture
producer innovation
autonomous innovatos
embedded open toolkit
distributed innovation system
cooperative resource exchange
open source science and research

we can create **user contribution systems**

community based knowledge system
amplified intelligence technology
collaborative user community
user developed innovation
collaborative innovation
collective intelligence
collective invention
e-collective work
crowdsourcing

The concept of user contribution isn't new, but companies have created user contribution systems. That is, they've created **methods for aggregating and leveraging people's contributions** and behaviors in ways that are useful to other people.

Scott Cook, Intuit Inc

user

employees, customers, or even people with no previous affliation to the organization

contribution

can be active (work, expertise, or information) or passive and even unknowing (behavioral data)

system

the method or platform, usually internet-based, by which contributions are aggregated and automatically converted into something useful to others

here's a brief example of how it works

(from a product manufacturing perspective)

Manufacturer activity

User-manufacturer boundary

User activity

User draws on local need information to specify desired product or service.

Manufacturer draws on local capability information to develop prototype responsive to specifications.

User draws on local need and context of use information to evaluate prototype.
User changes specifications as needed.

Manufacturer iterates until user is satisfied.

User iterates until satisfied.

here's a few examples of companies who have created **user contribution systems**

Proctor and Gam

connect + develop

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(This is your email address)

Password:

▸ Log in

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User Home

Submit Your Innovation

Browse P&G Needs

Browse P&G Assets

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P&G Pharmaceuticals

Connect + Develop Examples

Olay® Derma-Pod
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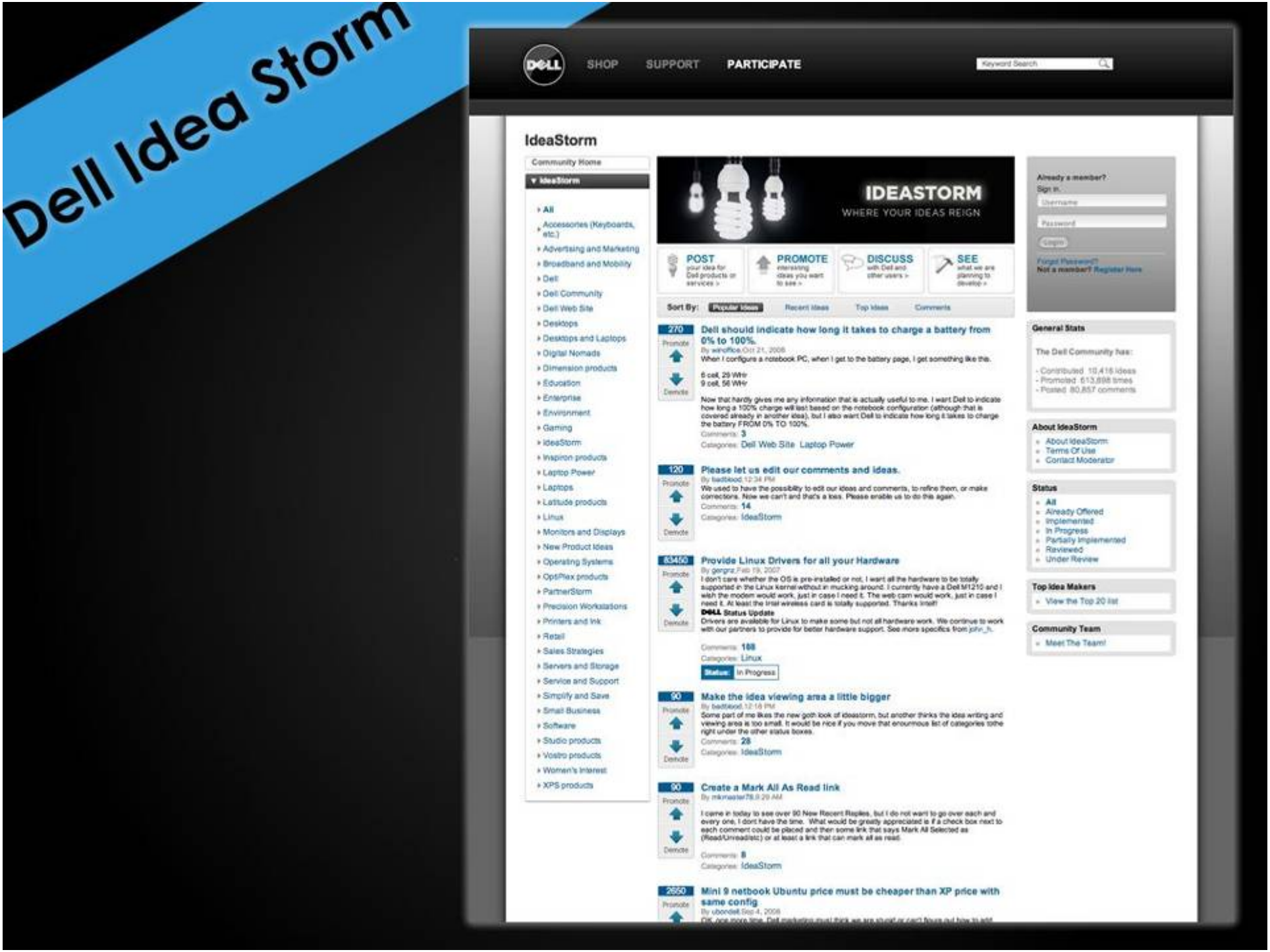
connect + develop™

External collaboration plays a key role in nearly 50 percent of P&G's products. We've collaborated with outside partners for generations but the importance of these alliances has never been greater.

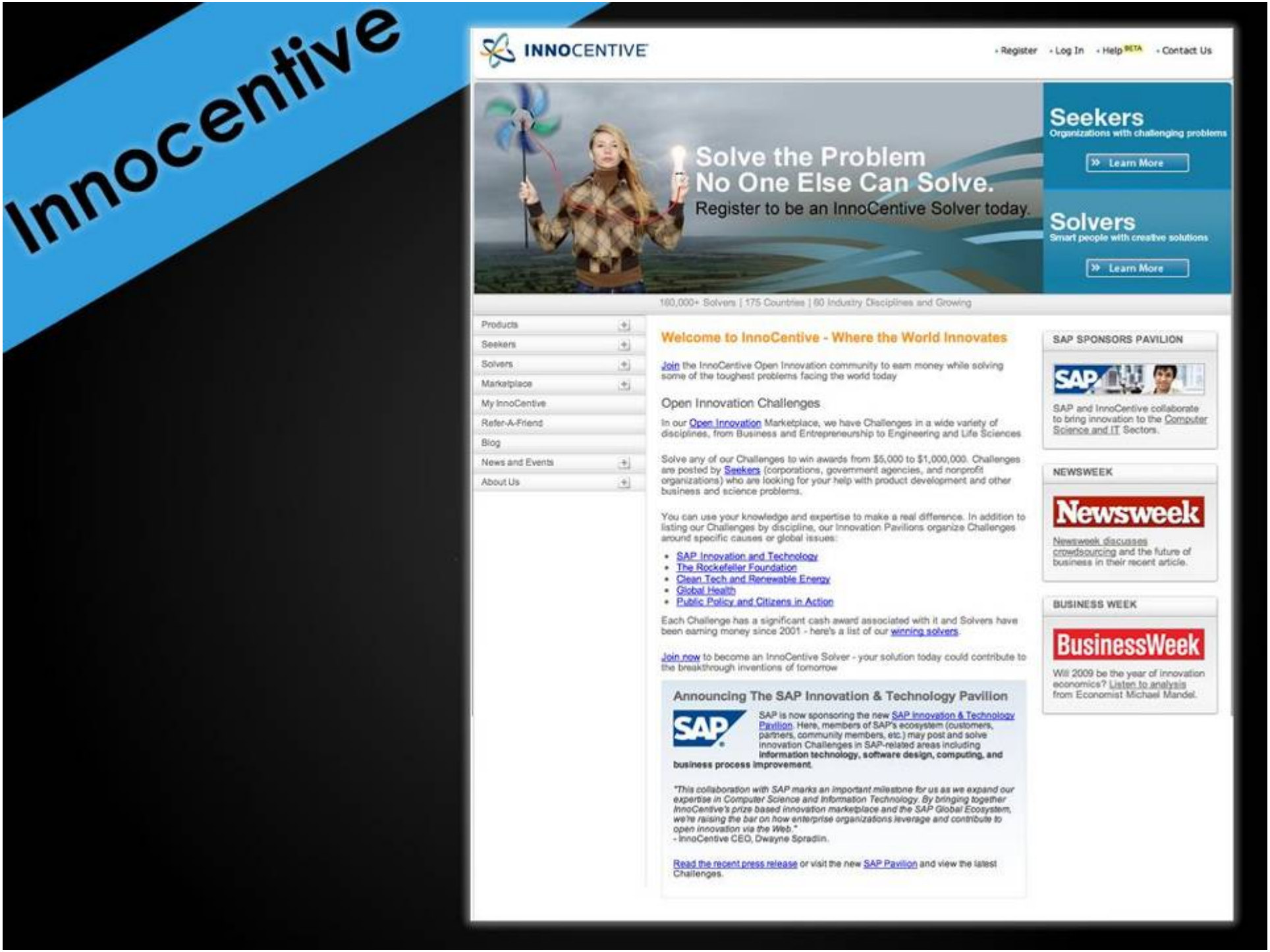
Our vision is simple. We want P&G to be known as the company that collaborates — inside and out — better than any other company in the world.

- A.G. Lafley
Chairman of the Board and
Chief Executive Officer

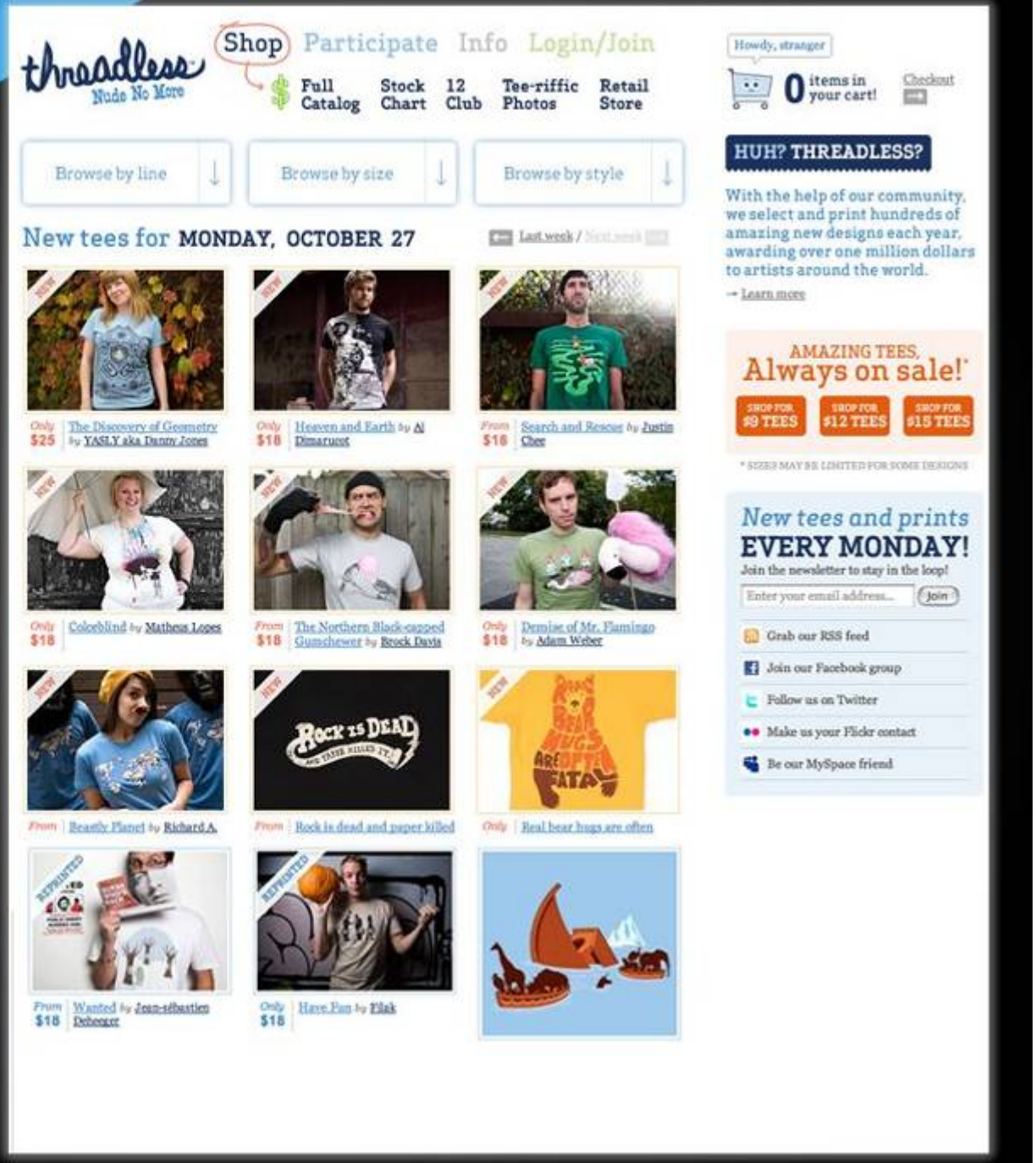
Dell Idea Storm



Innocentive



Threadless


threadless
Nude No More
Shop
Participate
Info
Login/Join
Full Catalog
Stock Chart
12 Club
Tee-riffic Photos
Retail Store
Howdy, stranger
0 items in your cart!
Checkout
Browse by line
Browse by size
Browse by style
New tees for MONDAY, OCTOBER 27
Last week / Next week
Only $25 | The Discovery of Geometry by YASLY aka Danny Jones
Only $18 | Heaven and Earth by Al Dimarucot
From $18 | Search and Rescue by Justin Cher
Only $18 | Colorblind by Matheus Lopes
From $18 | The Northern Black-capped Gumchewer by Brock Davis
Only $18 | Demise of Mr. Flamingo by Adam Weber
From | Beastly Planet by Richard A.
From | Rock is dead and paper killed
Only | Real bear hugs are often
From $18 | Wanted by Jean-sébastien Deheeger
Only $18 | Have Fun by Filak
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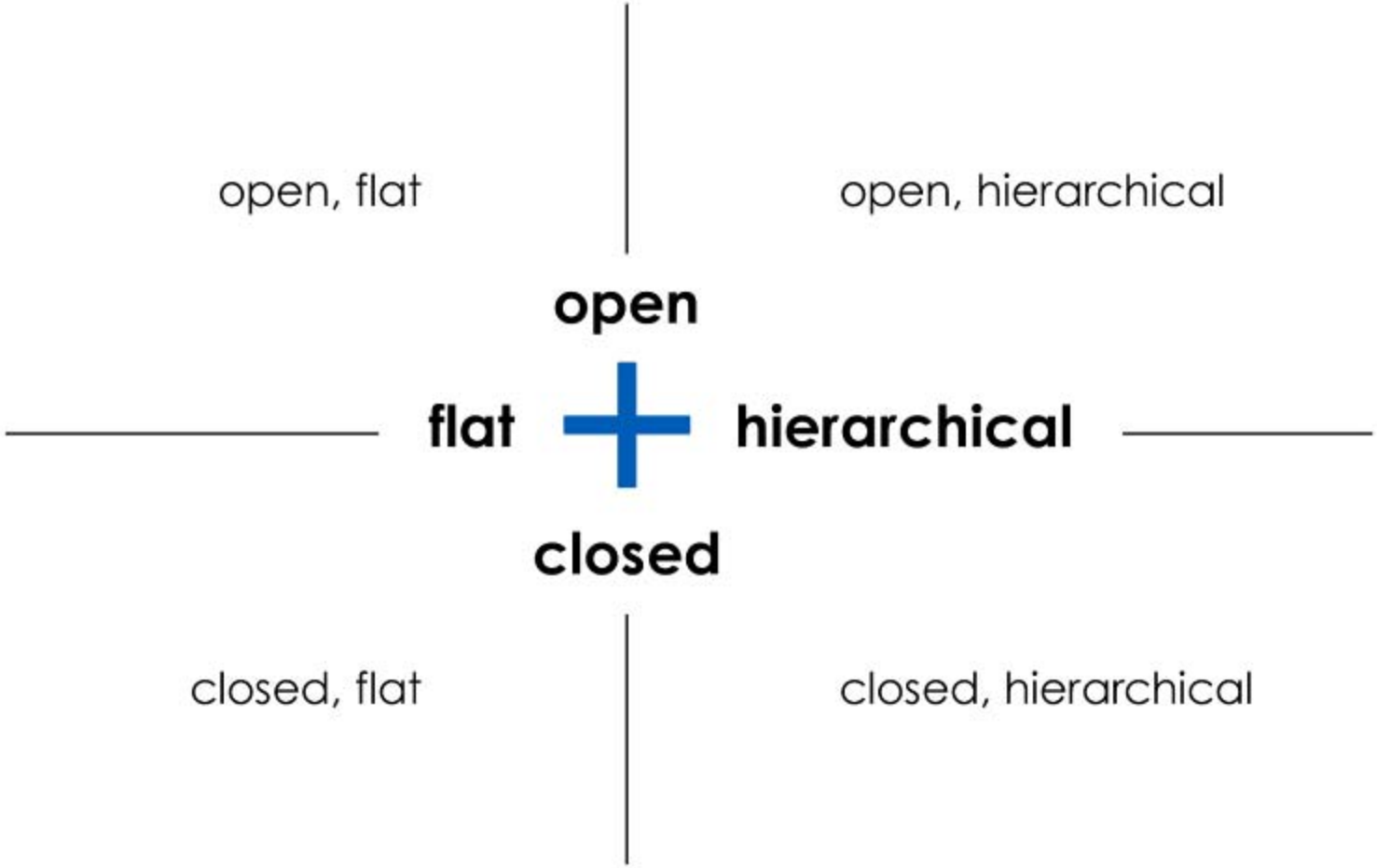
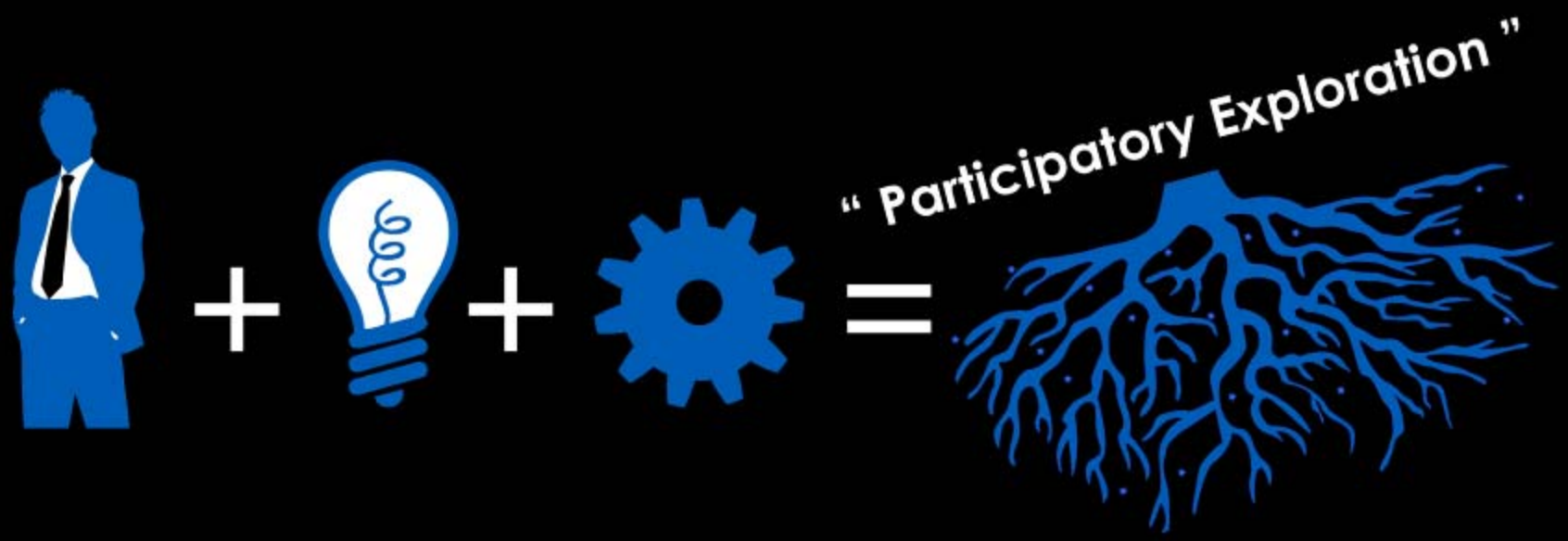
Follow us on Twitter
Make us your Flickr contact
Be our MySpace friend

which kind of collaboration is right for you?



"The leaders in innovation will be those who figure out the best way to **leverage a network of outsiders**."

Gary P. Pisano and Roberto Veranti, HBR December 2008



at NASA, this could be what we call
"Participatory Exploration"

for **a directory** of participatory space projects visit...

Astronaut Glove Challenge

The 2009 Astronaut Glove Challenge is designed to promote the development of glove joint technology, resulting in a highly dexterous and flexible glove that can be used by astronauts over long periods of time for space or planetary surface excursions. [...]

Celestia

An open-source, photo-realistic, real-time, three-dimensional viewing of the solar system, the galaxy and the universe. Celestia is an easy to use, freely-distributed, multi-platform, open source, software package which has become a valuable tool for astronomy education. Used in homes, schools, museums and planetariums around the world, it also is used as a visualization tool by space mission designers. Versions are available for computers running Windows, Macintosh (Mac OS X) and Linux operating systems. [...]

Radio JOVE

The Radio JOVE project is a hands-on inquiry-based educational project that allows students, teachers and the general public to learn about radio astronomy by building their own radio telescope from an inexpensive kit and/or using remote radio telescopes through the internet. Radio JOVE students and amateur scientists observe and analyze natural radio emissions of Jupiter, the Sun, and our galaxy. Participants also collaborate with each other through interactions and sharing of data on the network. [...]

HiRISE Clickworkers

Help scientists search for landforms and identify new places to take pictures on Mars. The HiRISE camera, one of the instruments on the Mars Reconnaissance Orbiter, has been sending back high-resolution images of Mars since late 2006. [...]

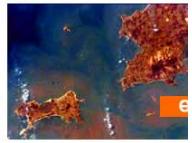
NASA World Wind

An open source 3D interactive world viewer created by NASA's Learning Technologies project, released in mid-2004. It is now developed by NASA staff and open source community developers. World Wind lets you zoom from satellite altitude into any place on Earth. Leveraging Landsat satellite imagery and Shuttle Radar Topography Mission data, World Wind lets you experience Earth terrain in visually rich 3D, just as if you were really there. [...]

Open Luna Foundation

A stepped program of robotic missions that seek to return mankind to the lunar surface, and to do it in such a way that it is accessible to everyone. The Open Luna Foundation is open source and invites everyone (hardware providers, writers, wiki-editors, designers, etc.) to contribute and share what you want to do and what science you would like to see done on their wiki. One of their specific aims is to reach out to the community and educational systems to spread interest, enthusiasm, and involvement. [...]

ISS EarthKAM



A NASA education program that prov quality photographs of our planet tak students. Using the web to direct a di space flights and the International Sp middle schools request images base classroom investigations. Teachers, administrators, and other youth orgar allowed to sign up for ISS EarthKAM students. [...]

http://www.spacehack.org

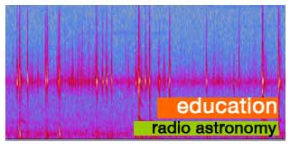
100 Hours of Astronomy

A four-day event designed to bring astronomy to the public around the world. Whether it's a few hours on one day or a 100-hour marathon event, how groups choose to participate is up to them. One of the key goals of 100 Hours of Astronomy is to have as many people as possible look through a telescope as Galileo did for the first time 400 years ago. Plans should fit the resources and enthusiasm that's available and typically range from telescope viewing get-togethers, live science centers, research observatory webcasts and sidewalk astronomy events. All activities and events during 100HA will bring astronomy to a new audience. [...]

Thacher Scholar Award

A contest for secondary school students (grades 9-12) demonstrating, via a written report, the best use of geospatial technologies or data to study Earth. Eligible geospatial tools and data include satellite remote sensing, aerial photography, geographic information systems (GIS), and Global Positioning System (GPS). Geospatial technologies and data have numerous uses in science research, ranging from archaeology to interactions among the Earth's atmosphere, biosphere, geosphere and hydrosphere. The main focus of the project must be on the application of geospatial tool(s) or data to study a problem related to Earth's environment. Entries can be submitted by individuals or teams. [...]

INSPIRE Project



A non-profit scientific, educational project whose objective is to bring the excitement of observing natural and man-made radio waves to high school students. Underlying this objective is the conviction that science and technology are the underpinnings of our modern society, and that only with an understanding of science and technology can people make correct decisions in their lives, public, professional, and private. INSPIRE (Interactive NASA Space Physics Ionosphere Radio Experiment) also is an innovative, unique opportunity for students to actively gather data that might be used in a basic research project. The INSPIRE project uses build-it-yourself kits to measure and record VLF emissions such as tweeks, whistlers, sferics, and chorus along with man-made emissions. [...]

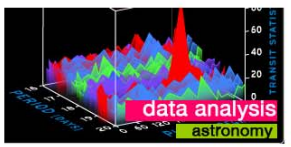
Stardust@Home

Together, you and thousands of other Stardust@Home participants will find the first pristine interstellar dust particles ever brought to Earth. Nestled within the Stardust spacecraft's capsule in 2006 were precious particles collected during its dramatic encounter with comet Wild 2 and something else, even rarer and no less precious: tiny particles of interstellar dust that originate in distant stars, light-years away. They are the first such pristine particles ever collected in space, and scientists are eagerly waiting for their chance to "get their hands" on them. [...]

Elevator:2010

This project is divided into two challenges: Power Beaming and Tether Strength. The Space Elevator vision will not only further space exploration and knowledge, but has the potential to shape the existential future of the human race for centuries to come. Elevator:2010 is designed to address the "social engineering" of the Space Elevator. Taking their cue from the X-prize, solar car races, and various other competitive ventures, Elevator:2010 uses engineering competitions as a tool to capture mind-share in academia, space enthusiast community, and the general public. [...]

PlanetQuest Collaboratory



The PlanetQuest Collaboratory will turn your computer (Mac, PC, Linux, and others) into a virtual astronomical observatory that you can use to make and share real scientific discoveries. Our telescopes are focused on extremely dense star regions, such as the center of the galaxy in Sagittarius, and when an observing run ends and thousands of images have been collected, data will be downloaded to your computer and your Collaboratory software will begin analyzing it. You can classify stars no one has cataloged before, use the Collaboratory to do your own research, and maybe even find a new planet! The project is currently in development and alpha testing. [...]

SETI@home

In 1995, David Gedye proposed virtual supercomputer composed Internet-connected computers, ar SETI@home project to explore th Extraterrestrial Intelligence) is a s goal is to detect intelligent life out approach, known as radio SETI, listen for narrow-bandwidth radio Such signals are not known to oc detection would provide evidence technology. [...]

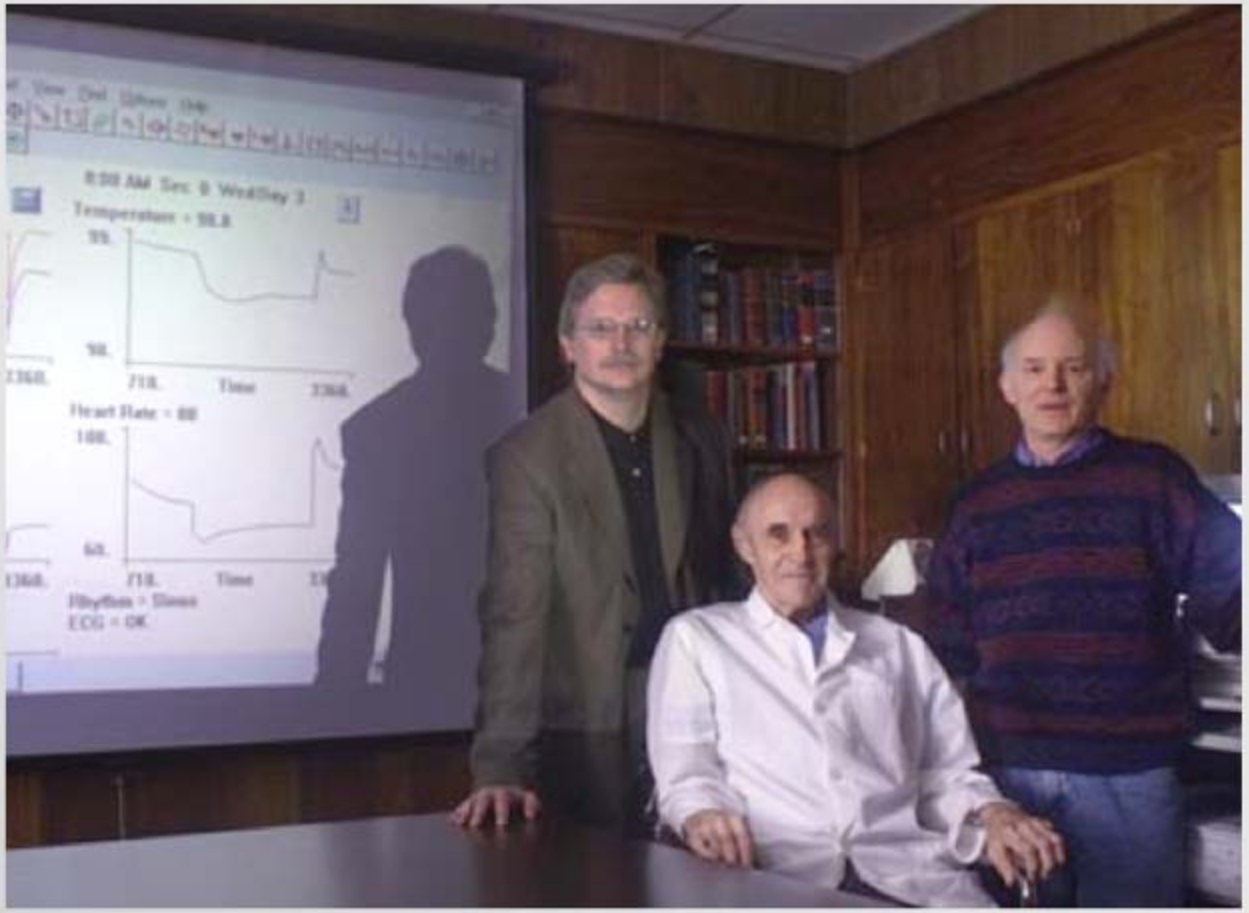
"The participation revolution now underway opens up new possibilities for billions of people to play **active roles** in their workplaces, communities, national democracies, and the global economy at large."

Wikinomics by Don Tapscott and Anthony Williams

IV a case study

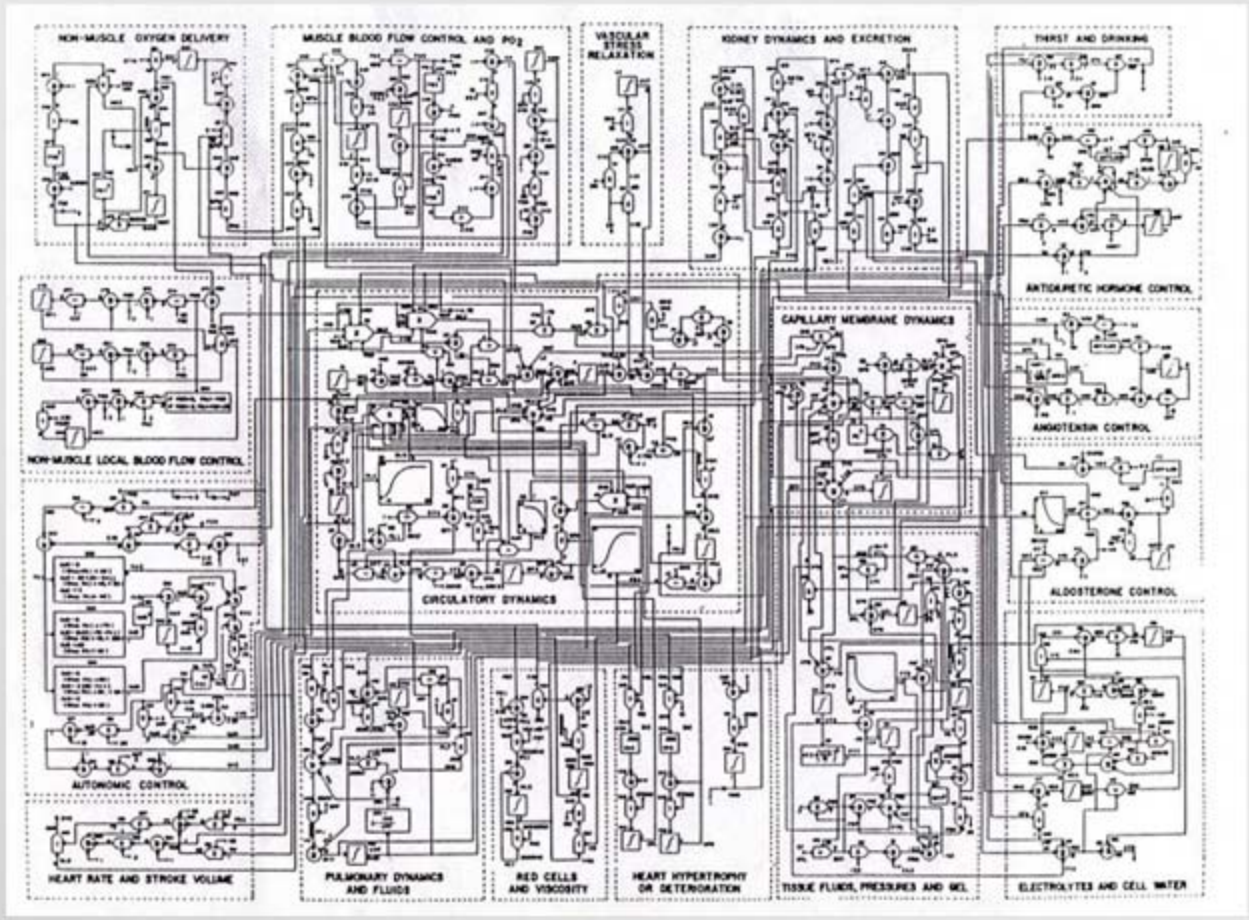
how about an example of a **user contribution system** being developed at **NASA** right now?

the **digital astronaut** is a sophisticated compendium of knowledge and computational modeling tool that can be used to construct predictive simulations of the human body system

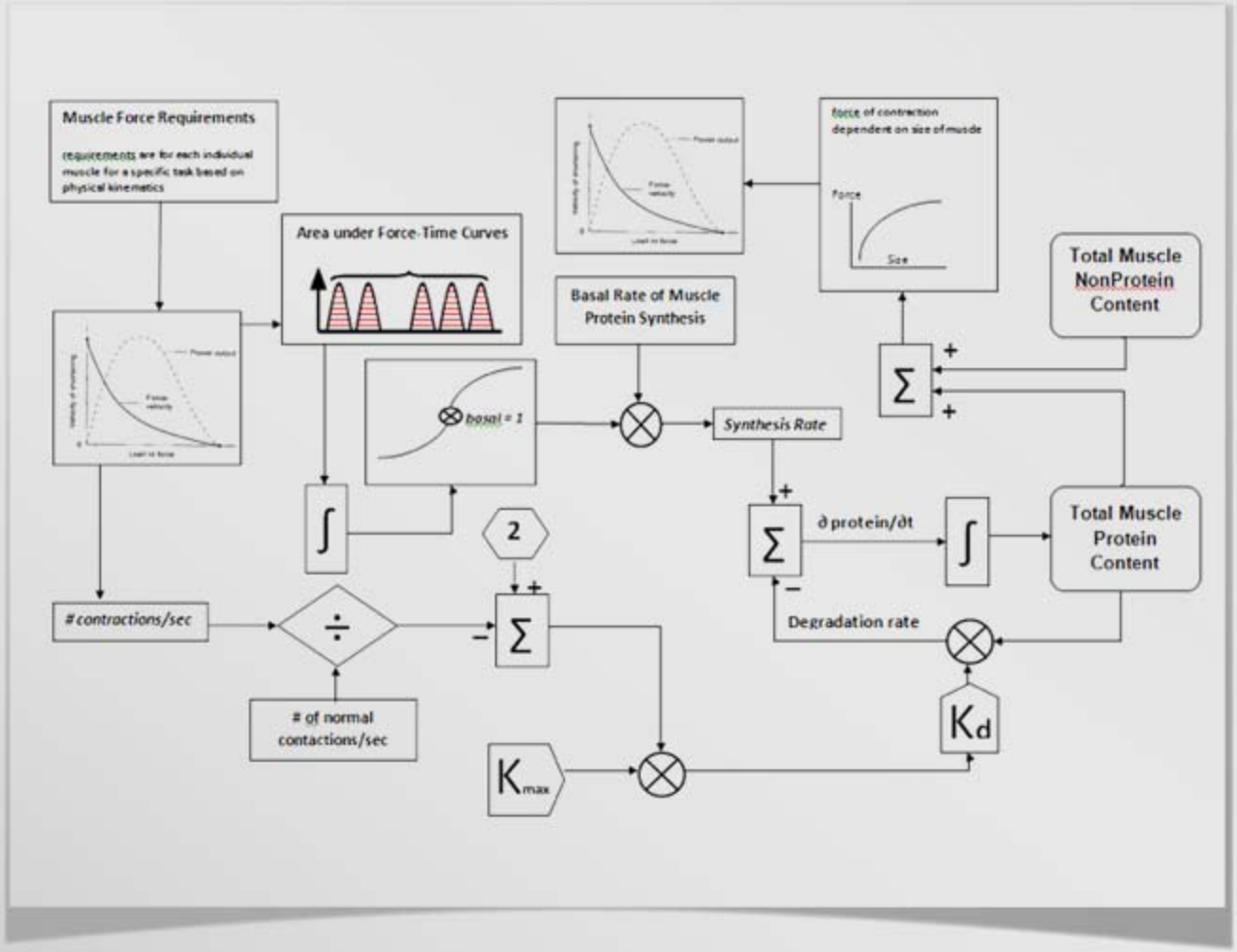


developers of the quantitative physiology model

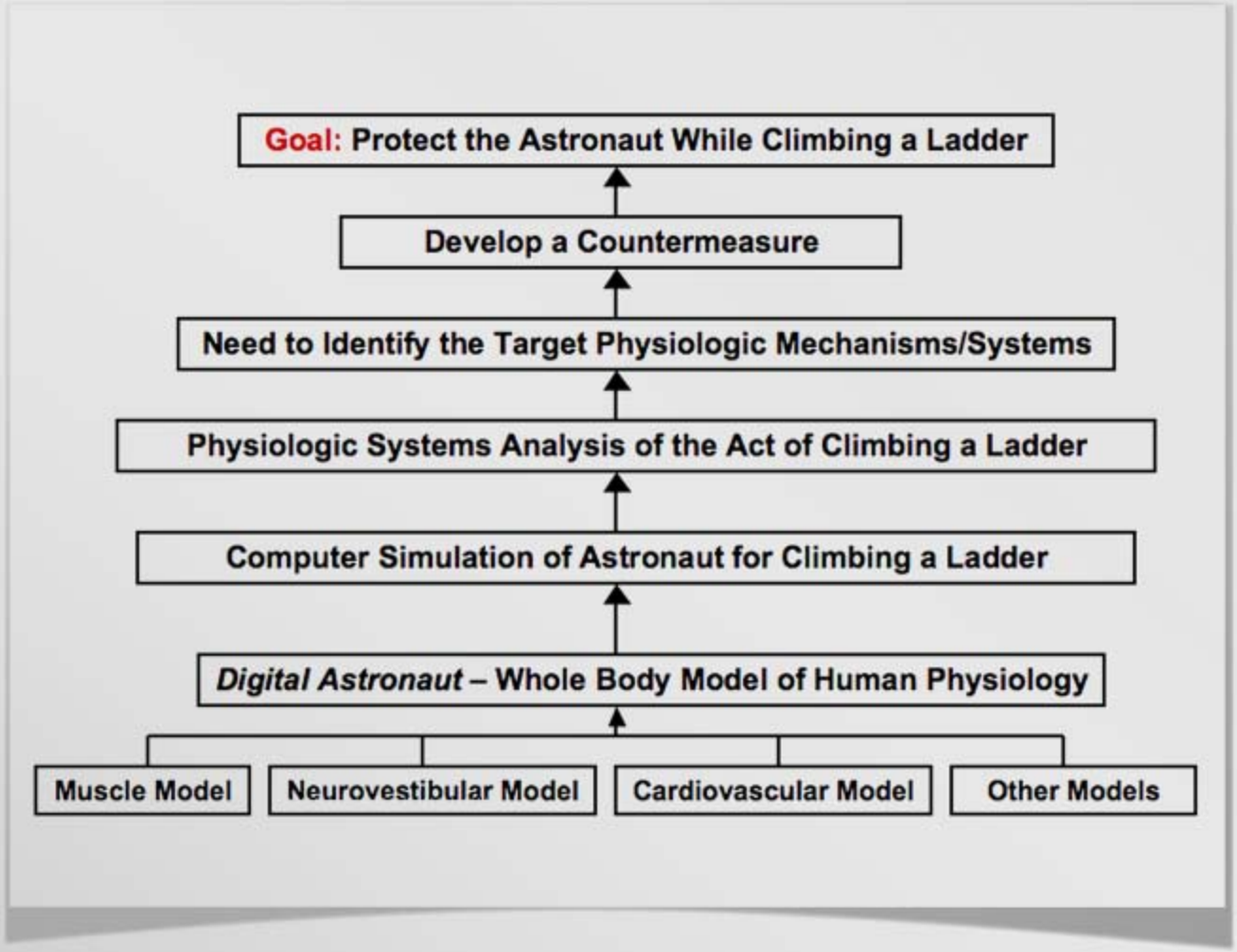
Guyton, Coleman, Summers at the University of Mississippi Medical Center



this is the original model schematic



scientists can use the digital astronaut to simulate systematic reactions to spaceflight (such as changes in skeletal muscle size)



and develop more effective countermeasures for long duration human spacefight missions

what if we opened up the **digital astronaut** as a user contribution system?

what if we engage others to help **expand** the knowledge base, **improve** the design, or further **develop** the model?

what if we **share 40 years of science and research** so that anyone can reference the knowledge or run virtual experiments to model interactions of the human body?

"No matter who you are,
the smartest people work for someone else."

Bill Joy, Sun Microsystems

user

scientists, academia, medical industry, gamers, artists, engineers, students, etc.

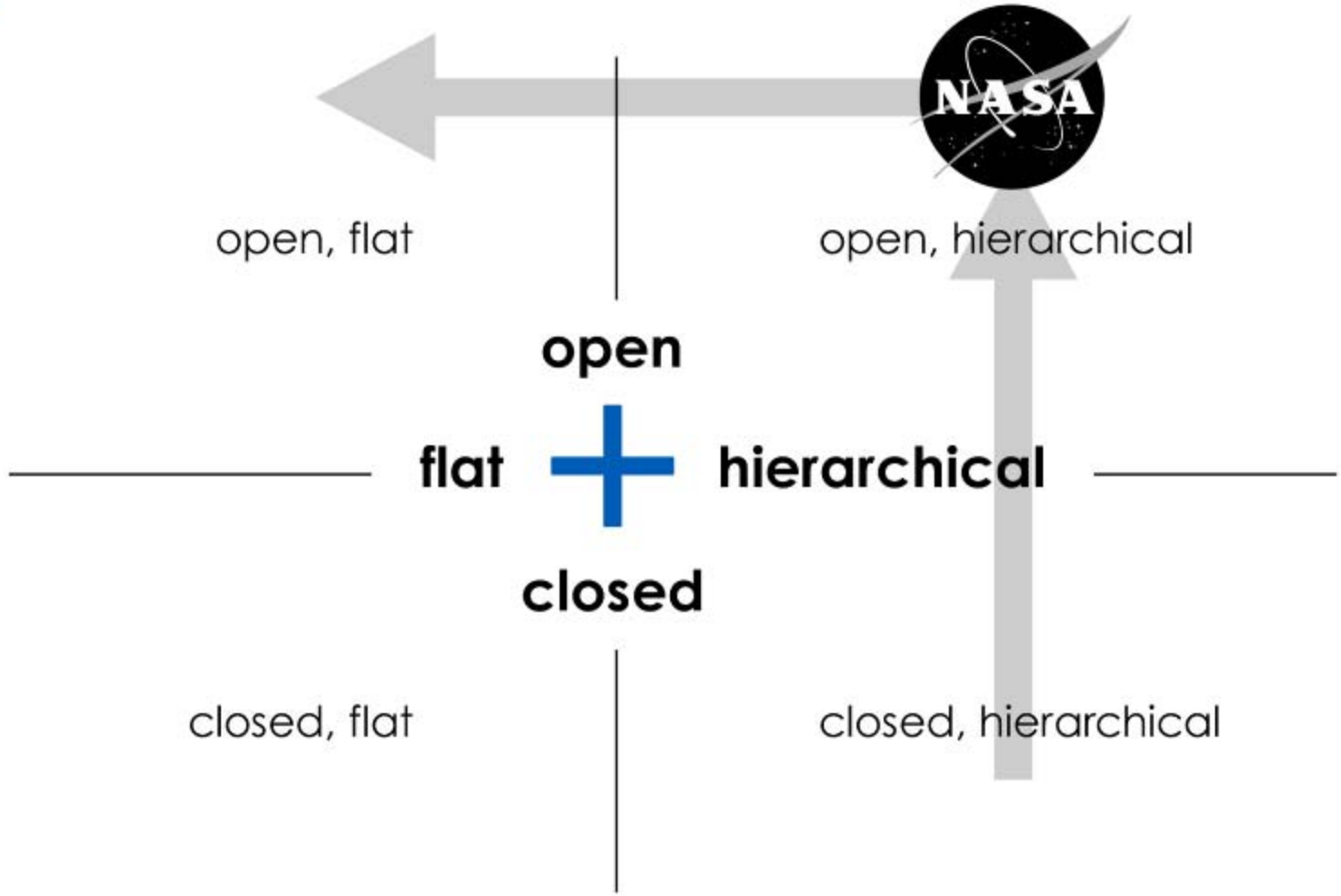
contribution

science knowledge
research data
software development
data manipulation
model simulations

system

XML based model and modules, along with toolkit, offered via the internet. Website to aggregate knowledge, data, and model simulations

digital astronaut collaboration style




nasa.gov
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software development
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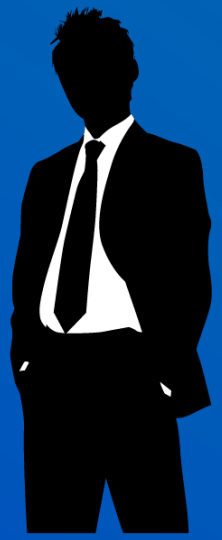
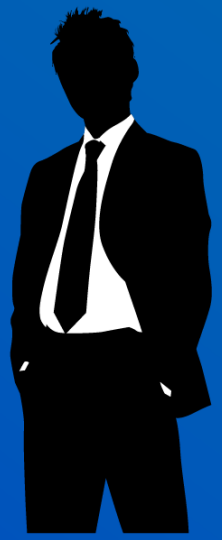
data and simulation center
community
science plan
compedium of knowledge


V
takeaway's



here are the 3 main thoughts to take away from this presentation...

NASA has an opportunity to **catalyze innovation** by taking advantage of the global shifts in **demographics**, the desire for **engagement** and the emergence of **collaborative technology**



participatory exploration is more than just education outreach; it is a way to help with some of NASA's most pressing challenges

participatory exploration can be implemented by creating **user contribution systems**; this can be applied to more than just software projects

how will you contribute to...

the **future of space exploration** ?


participatory exploration
the role of the user contribution system

participatory exploration

the role of the user contribution system

nicholas skytland
twitter.com/skytland
nicholas.g.skytland@nasa.gov

Nicholas Skytland is a project manager at NASA working on two projects - the EVA Physiology, Systems and Performance Project (EPSP), as well as the Digital Astronaut Project, within the Space Life Sciences Directorate at Johnson Space Center (JSC). His work includes developing an open innovation framework within NASA to offer individuals, academia, companies, and others the opportunity to directly contribute to space exploration.

Skytland holds a master's degree from the International Space University in Space Studies and a bachelor's degree from Valparaiso University in Mechanical Engineering. He is currently pursuing an MBA degree at the University of Texas.

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from other presentations

[15] [30] image: slide 8 and 27 of "*Government 2.0*" presentation respectively, http://www.slideshare.net/remarkk/mesh-metronauts

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